United States Energy Association
Clean EDGE (Enhancing Development and Growth through Energy) Asia
Indo-Pacific Energy Market Investment and Modernization (EMIM)
Request for Proposals – Bhutan Hydrogen Market Study

Request for Proposals – Hydrogen Market Study for the Department of Hydropower & Power Systems of Bhutan

Closing date:	**June 10, 2022**
Implementing Organization:	**United States Energy Association**
Funding Agency:	**U.S. Department of State, Bureau of Energy Resources**

The United States Energy Association (USEA) is inviting hydrogen market or other relevant energy experts through this Request for Proposals (RFP) to submit proposals to conduct a hydrogen market study to support the Department of Hydropower & Power Systems (DHPS) of Bhutan. Eligible applicants for this RFP include non-profits, for profit entities, individuals/consultants, and educational institutions. This is an activity implemented by the United States Energy Association (USEA) with funding from the U.S. Department of State, Bureau of Energy Resources (ENR). As this is a U.S. Government-funded project, the RFP follows all relevant federal procurement regulations and laws. Following U.S. Government funding rules, profits cannot be charged to this project. All bidder details will be kept confidential.

Proposals are due by 17:00 hours EST of the closing date. Please forward your proposal in soft copy (PDF form) to Mr. Brendon Thomas, Program Coordinator, at bthomas@usea.org.

I. INTRODUCTION

The U.S. Energy Association (USEA), headquartered in Washington, D.C., is an association of public and private energy related organizations, corporations, and government agencies. USEA represents the broad interests of the U.S. energy sector by increasing the understanding of energy issues, both domestically and internationally.

Through a cooperative agreement with ENR, USEA implements the Clean EDGE Asia Indo-Pacific Energy Market Investment and Modernization (EMIM) program to support the U.S. Government's Clean EDGE Asea initiative. EMIM aims to strengthen the energy security of allies and partners; create open, efficient, rule-based, and transparent energy markets; improve free, fair, and reciprocal trading agreements; and to expand access to affordable and reliable energy. This activity in South Asia will support the Royal Government of Bhutan.

II. PROGRAM BACKGROUND

Based on the scope of requested support from the Bhutan Department of Hydropower and Power Systems (DHPS), USEA developed a work plan covering April 2022 – June 2023, which includes a hydrogen market study. The ENR-funded EMIM activity in Bhutan will be implemented under USAID's agreement with the Government of Bhutan for assistance under the Clean EDGE initiative, which was approved by the Government of Bhutan in 2020. USAID has a long history of working with the Government of Bhutan and has current energy programming in the country. ENR will continue managing EMIM activities, including this market study, and lead communication with DHPS.

INTRODUCTION TO BHUTAN AND THE DEPARTMENT OF HYDROPOWER & POWER SYSTEMS

Bhutan is committed to promoting sustainable hydropower for socio-economic development in pursuit of Gross National Happiness (GNH). An important part of raising GNH is minimizing the environmental and social impact of large-scale hydropower developments and infrastructure projects while maximizing its economic benefits to its people. As mandated in its constitution, Bhutan must preserve over 60% of its land as forest cover. The DHPS is responsible for ensuring that hydropower exports generate maximum revenue for the nation and provide reliable, secure, and affordable energy for domestic consumers and explore opportunities for export in the regional market in South Asia by developing renewable hydropower in the country.

In Bhutan, hydropower is a strategic national resource and primary driver of economic growth. In addition to meeting domestic demand, surplus electricity is exported to India, thereby increasing government revenue, and achieving a positive balance of payment. Installed capacity has reached 2,326 MW as of 2019, and accordingly the Royal Government of Bhutan (RGoB) has a goal of achieving a minimum of 5,000 MW by 2030. It is estimated that the overall generation potential is around 36,900 MW as per the Power System Master Plan of Bhutan 2040. The RGoB has prioritized the development of projects with pumped storage and reservoir facilities to address the concerns of seasonality of hydro resources, thereby increasing energy security in the future and enhancing foreign revenue earnings. In addition, the RGoB is looking to enhance its ancillary services capabilities/industry, develop green hydrogen, and contribute towards the development of clean energy and technologies to mitigate problems related to global warming and climate change.

Despite Bhutan's abundant hydropower resources, the current generation capacity lacks adequate storage during the dry season and a limited diversity of domestic electricity generation sources present risks to the country's energy security. With hydrogen recently emerging as a promising solution within the global energy landscape, DHPS has expressed interest in exploring the prospect of green hydrogen for the context of Bhutan, where surplus electricity generated by hydropower during the wet season, which otherwise would have been curtailed, could potentially be converted to hydrogen. The hydropower generated hydrogen can also be used in electrifying and decarbonizing Bhutan's major energy end-use sectors such as the transport sector and industries. Green hydrogen also presents an opportunity for Bhutan to increase exports of energy to the region. There are many plausible hydrogen value chains to be considered for the RGoB.

In order to support Bhutan's sustainable development goals, DHPS is seeking expert assistance with a hydrogen market study. The study will primarily focus on Bhutan's green hydrogen generation potential and the potential for Bhutan to export surplus hydrogen to international markets.

This RFP aims to identify qualified experts to provide assistance to DHPS management and staff under the direction of USEA. Submissions may include a single expert or multiple experts, and submissions will be accepted from companies, institutions, and individual consultants.

The proposals could include and detail the submitter's:

- Knowledge of hydrogen generation from hydropower

- Regulatory expertise in hydrogen transport
- Experience in researching hydrogen market potential

Additional experience sought includes:

- Ability to conduct a price analysis (financial and economic analysis) of hydrogen production and transport costs
- Regional experience and/or knowledge of Bhutan's energy sector
- Experience in drafting energy market studies

III. SCOPE OF WORK

The objective of this market study is to prepare and assist DHPS management and staff in their efforts to understand and potentially develop green hydrogen production and export capacity. Through the study of hydrogen market potential, it is expected that DHPS staff will be able to successfully determine their plans for hydrogen development and ensure sustainable development for the people of Bhutan.

PROJECT TASKS AND DELIVERABLES

Hired experts will conduct a market study for the potential production of green hydrogen in Bhutan from hydropower resources and analyze demand in the regional market. The study will identify potential locations for hydrogen production stations, various transportation and storage options, impacts on availability of electricity generation resources, infrastructure requirements to support hydrogen production, potential end-uses in Bhutan and nearby markets, and cost projections for green hydrogen production and deployment in Bhutan. The study shall propose recommendations and policy/regulatory interventions for green hydrogen development, as well as established best practices in the field of green hydrogen development.

Experts will be responsible for collecting background information and conducting research and will maintain an open line of communication (via email, phone, virtual meeting) with relevant DHPS and USEA staff throughout the period of performance to ensure the market study is on the right track and topics are relevant. In addition to providing monthly reports to USEA and DHPS on the status of the market study, experts will participate in bi-weekly coordination calls with USEA, as well as USEA-facilitated virtual introductory, draft review, and final meetings with DHPS.

At the onset of this contract the chosen institution or individual will review available documentation on DHPS' background, Bhutan's hydropower capacity, potential for hydrogen generation, and other relevant market information related to the hydrogen sector. Travel may be required to complete the tasks in this project, and applicants must be willing and able to conduct short-term international travel. The chosen institution or individual will then carry out the following tasks:

Task 1: Document Review & Progress Reports

Experts will support DHPS through remote review of documents and virtual meetings. To begin the study, the hired experts will familiarize themselves with Bhutan's past and current hydropower development, evaluate the existing literature, and acquire additional data/research for the draft report. Hired experts will work closely with USEA/ENR staff by sharing outlines and drafts for review and comments and submit monthly progress reports to USEA throughout the engagement.

Task 2: Hydrogen Market Study

The hydrogen market study length and number of pages will be determined in coordination with DHPS, be in Microsoft Word document form, and should include, but is not limited to, analysis of the following:

- Potential locations for hydrogen production stations and the type/size of electrolyzers
    - Calculation of the technical potentials of hydrogen-production technologies based on the availability of their feedstock (hydropower generated electricity)
    - Recommend appropriate technologies considering the context in Bhutan.

- Estimating hydrogen's serviceable consumption potential for possible hydrogen end use applications and the technical potential for producing hydrogen from existing and planned hydropower capacity
    - Serviceable consumption potential for hydrogen applications in Bhutan
        - Seasonal storage for the electric grid
        - Natural gas supplementation for industrial purposes
        - Synthetic hydrocarbons
        - Biofuels
        - Fuel cell electric vehicles (light, medium, & heavy duty)

- Estimate of the market and economic potential of hydrogen:
    - Cost projections for green hydrogen production and deployment in Bhutan
        - For example, the quantity of hydrogen at an equilibrium price at which suppliers are willing to sell and consumers are willing to buy the same quantity of hydrogen
            - This could include the development of economic potentials for multiple scenarios across various market and technology-advancement assumptions.
    - Estimates of hydrogen's economic potential by developing supply and demand curves for hydrogen production and use. The demand curves could be based on the threshold price (i.e., estimate of the maximum price customers are willing to pay) for various quantities of hydrogen in the market, which is affected by projected prices for alternatives that could provide the same service (e.g., fuel for vehicles, feedstock for metals refining, etc.)

- Hydrogen transportation and storage options that are suitable for the Bhutanese system and market
- Impacts on the availability of electricity supply as a result of increased use of electricity for hydrogen generation
    - Impact on renewable energy generation levels with the development of a hydrogen generation sector
    - Percentage reduction in petroleum use through fuel cell vehicle substitution and the subsequent impact on CO2 emission levels

- Infrastructure requirements to support hydrogen production
    - Evaluation of the opportunities related to continuing evolution of electricity markets that would allow electrolyzers to monetize the energy and grid services that they can provide.

- Policy and regulatory recommendations for green hydrogen development
    - Case studies or geographically relevant examples of successful hydrogen development policy.
    - Safety aspects throughout the value chain.

Final structure and topics for analysis in the study will be subject to agreement between the DHPS, USEA and hired experts, and may evolve as the project progresses (e.g., after the initial assessment report).

Task 3: Mid-Project Check in Meeting

Upon completion of the draft hydrogen market study, hired experts will share the draft study with DHPS and provide a presentation of the recommendations and findings to DHPS staff using Microsoft PowerPoint. The presentation should be at

least 30 minutes in duration with at least 30 minutes allocated to responding to questions from DHPS staff. Discussion time will also be allocated for feedback on the report and consideration of areas for future work or support to DHPS. Final structure of the presentation will be subject to agreement between the DHPS, USEA, and hired experts. Draft presentation materials and the draft study will be due to USEA and DHPS at least one week before the presentation.

Task 4: Submission of Final Report

After the mid-project check in meeting the hired experts will review the feedback received from DHPS. The feedback received from DHPS should be incorporated and used to draft the final report. One month after the mid-project check in meeting it is expected that the hired experts will submit their final report to USEA for review. The detailed analysis models or tools (technical, economic, financial etc.) used for the market study to be shared along with the final report to DHPS.

Task 5: Technical Workshop to Present Findings to DHPS

After the approval of the final report by USEA and ENR, an in country technical workshop will be held to present the findings of the market study to DHPS including the detailed analysis models or tools (technical, economic, financial etc.) used for the market study and address any follow up questions, as well as explore areas for possible future cooperation. The final structure of the technical workshop will be subject to agreement between the DHPS, USEA, and hired experts and draft workshop materials will be due to USEA one week before the presentation.

Please note that travel and other relevant workshop costs will be covered directly by USEA and do not need to be detailed in the financial proposal.

IV. TENTATIVE SCHEDULE

Tasks	Deliverables	Duration
1. Initial review of documentation on DHPS' background and hydrogen generation potential to support the drafting of the market study	1. Initial assessment report 2. Monthly progress report	21 days after project launch
2. Initial draft market study report with recommendations for DHPS	1. Draft market study 2. Monthly progress reports	90 days after project launch
3. Mid-project check in meeting for key findings to be presented to DHPS staff and management, with time for feedback from DHPS	1. Draft virtual presentation materials 2. Monthly progress report	100 days after project launch
4. Submission of final report incorporating feedback from the mid-project presentation and discussions with DHPS staff	1. Final market study 2. Monthly progress report	130 days after project launch
5. In country technical workshop to present findings to DHPS	1. Draft presentation materials and formal agenda for the workshop	140 days after project launch

V. SUBMISSION CONTENT

The proposal must contain the following:

a) A cover letter; explaining areas of expertise and work experience, proposed approach of completing the tasks and work schedule, as well as knowledge of Bhutan's energy sector, if applicable. The letter should not exceed 10 pages in length.
b) A CV or CVs, including:
    - Summary of past relevant experience
    - Description of past work as it relates to the hydrogen sector
    - Summary of work conducted in international energy markets
    - Note: listed professional experience must include date ranges
c) Company/organization Data Universal Numbering System (DUNS) number and confirmation of current status in the System of Award Management (SAM); **if the submitter is an individual consultant, SAM/DUNS information is not required.**
d) Financial proposal including submitter's proposed hourly rate for this project and any other proposed expenses broken out by the following cost categories:
    a. Personnel (labor costs should be broken out by individual)
    b. Fringe Benefits
    c. Travel*
    d. Equipment*
    e. Supplies
    f. Contractual
    g. Construction*
    h. Other Direct Costs
    i. Total Indirect Costs (overhead)

*Note: no equipment purchases or construction costs are anticipated to complete this report. However, these line items should still be included in the financial proposal with a line item reading $0. All travel and workshop costs will be directly funded by USEA and do not need to be included in the financial proposal.

VI. EVALUATION CRITERIA AND CONTRACT MANAGEMENT/OVERSIGHT

Selection of an offer for subcontract award will be based on a quality and cost assessment of the technical qualifications, including prior relevant experience, as well as the financial proposal. Subcontract agreement management, oversight, and payment will be carried out by USEA. Costs incurred for the preparation and submission of a proposal are not eligible for reimbursement.

Submissions will be evaluated by a review team on the following basis:

- Past experience and project approach – 40%
- Subject matter expertise – 40%
- Financial proposal – 20%

VII. QUESTIONS AND CLARIFICATIONS

For all questions and clarification requests please contact Mr. Brendon Thomas, Program Coordinator, at bthomas@usea.org. Please submit questions prior to 17:00 EST May 27, 2022. All questions and answers will be made public on the USEA website on June 01, so that all interested parties are fully informed.

END OF REQUEST FOR PROPOSALS